The structure of Dutch /ɑu/

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Summary

In this talk we show that there are differences between the three so-called 'true' diphthongs of Dutch; in particular, we show that /ɑu/ has a more limited distribution than /ɛi/ and /œy/. We argue that the reason for this is the more consonantal status of the ending of /ɑu/, plus the fact that the two parts of /ɑu/ are less homorganic than the parts of other diphthongs. We also show that in the city dialect of Tilburg, *all* diphthongs behave as false diphthongs, but /ɑu/ is still special in its phonotactic distribution.

Structure of this talk

1. The issue: /ɑu/ as a false diphthong
2. An analysis in terms of Government Phonology
3. Tilburg Dutch
4. *pauk* and *glauk* and other problems
  Appendix. On historical contingency

!*'Scheppen', riep hij, 'gaat van Au!'*
(Leo Vroman, Ballade)

1. The issue: /ɑu/ as a false diphthong

Disregarding schwa, the Dutch vowel system (see, for instance, Trommelen and Zonneveld 1980, Booij 1995) is usually plotted in a symmetrical chart:

		front unrounded	front rounded	back
(1)				
	a. lax ('short')	ɪ	Y	ɔ
		ɛ		ɑ
	b. tense ('long')	i	y	u
		e	ø	o
				a
	c. diphthongs	ɛi	œy	ɑu

Next to these, one traditionally also recognizes a set of so-called 'false diphthongs':

(2)	'False' diphthongs	eʊ	ai
		iʊ	oi
		(yʊ)	ui

Properties of true and false diphthongs

i. The first part of true diphthongs is lax, the first part in false diphthongs is tense.

ii. The two constituing parts in true diphthongs are homorganic (*ɛu, etc.;), the two constituing parts in false diphthongs are not (*oʊ, etc.).

iii. True diphthongs can be followed tautosylabically by all consonants, but false diphthongs can only be followed by a coronal obstruent (and those usually function as inflectional suffixes); cf. (3).

(3) a.

bij [bɛi] 'bee'	rui [rœy] 'moult'	pauw [pɑu] 'peacock'
rijk [rɛik] 'rich'	ruik [rœyk] 'smell'	pauk [pɑuk] 'kettledrum'
lijf [lɛif] 'body'	kuif [kœyf] 'forelock'	_
krijt [krɛit] 'chalk'	fruit [frœyt] 'fruit'	koud [kɑut] 'cold'

b.

knoei [knui] 'swindle'		kieuw [kiʋ] 'gill'
*[roik]		*[kiʋk]
*[luif]		*[leʋf]
moois [mois] 'beautiful (partitive)'		schreeuwt [sxreʋt] 'shouts'

Yet the upper righthand box in (3) is somewhat misleading on closer inspection. If we fill in the other possible word-final consonants, we get the following picture (Dutch has final devoicing, so it stands to reason that no diphthong will ever be followed by a voiced obstruent). On /r/ see Trommelen and Zonneveld 1989; /ŋ/ can only follow short lax vowels (Booij 1995; Van Oostendorp 2001).

(4)

	ɛi	œy	ɑu
_#	bij [bɛi] 'bee'	rui [rœy] 'moult'	pauw [pɑu] 'peacock'
_x	hijg [hɛix] 'pant'	ruig [rœyx] 'rough'	___
_k	rijk [rɛik] 'rich'	ruik [rœyk] 'smell'	pauk [pɑuk] 'drum'
_ŋ	___	___	___
_f	lijf [lɛif] 'body'	kuif [kœyf] 'forelock'	___
_p	rijp [rɛip] 'ripe'	kuip [kœyp] 'tub'	___
_m	lijm [lɛim] 'glue'	luim [lœym] 'humour'	___
_s	reis [rɛis] 'trip'	ruis [rœys] 'noise'	kous [kɑus] 'stocking'
_t	krijt [krɛit] 'chalk'	fruit [frœyt] 'fruit'	koud [kɑut] 'cold'
_n	klein [klɛin] 'small'	tuin [tœyn] 'garden'	faun [fɑun] 'faun'
_r	___	___	___
_l	pijl [pɛil] 'small'	vuil [vœyl] 'dirty'	Paul [pɑul] 'Paul'

We have shaded three boxes which seem to be only marginally filled, i.e. by a small number of loan words or names. For instance, *pauk* is one of the very few words in which the diphthong *au* is followed by a noncoronal stop (the other word we have been able to find is *glauk* '(kind of) blue'). We disregard these words at first, but will return to them in section 4. Also the strange fact that /r/ and /ŋ/ cannot be preceded by tautosyllabic diphthongs is beyond the scope of the present paper.

Note that English *ou* has a similar distribution (Anderson 1986, Harris 1994:278 Hammond 1999:109):

(5)   *mouth, shout, house, crown, foul,* *[plaum], *[raub], *[taug]
       cf. *ripe, like, puke*

/ɑu/ thus behaves more like a false diphthong, as far as property iii is concerned. As far as we are aware, this has gone hitherto unnoticed in the literature (cf. Brink 1970, who comes quite close).

(6)   /ɑu/ can only be followed by a voiceless coronal obstruent

 (6) is the fact we try to explain in this paper (synchronically; in the appendix the reader can find some thoughts about a possible diachronic explanation)
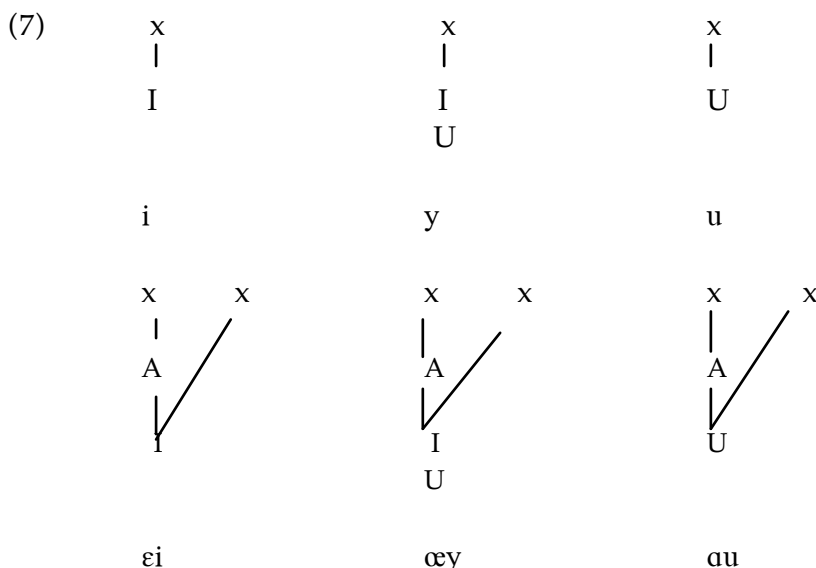
Disclaimer: We disregard here the fact that central vowels tend to slightly diphthongize phonetically ([eʲ, øʲ, oʷ]) (Van der Velde 1996), a fact that is usually argued to be of no consequence for the phonology; the fact that the various 'true' diphthongs can get different realisations in different dialects of Dutch ('t Hart 1969); and the fact that in the speech of youngsters in the provinces of North- and South-Holland, coda /l/ is often vocalised, yielding new diphthong-like sequences such as [mɛʊk] (Van Reenen 1986; Van Reenen and Jongkind 2000).

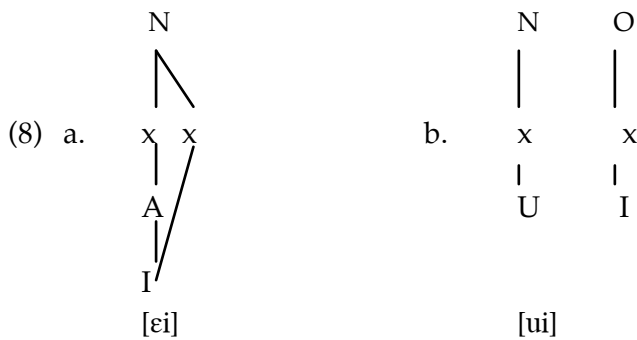## 2. Analysis in terms of Government Phonology

We will try to solve the puzzle using the notational apparatus of Government Phonology (Kaye, Lowenstamm and Vergnaud 1985, 1990; Harris 1994); the theory will be mixed with some notions of other frameworks, in particular Optimality Theory ('Diet Government Phonology').
There are three relevant places of articulation, which are represented by 'elements' , |I| (giving front unrounded vowels in isolation) and |U| (giving back rounded vowels in isolation). Front rounded vowels are denoted as |I,U| in this system, reflecting their typologically marked status. The element |A| is used here to represent lowness (and in some cases unrounded backness).
As an illustration, three high tense vowels ([i, y, u]) and the diphthongs can thus be represented as follows (Smith et al. 1989):

(7)
```
    x                  x                  x
    |                  |                  |
    I                  I                  U
                       U

    i                  y                  u


   x    x            x    x            x    x
   |   /             |   /             |   /
   A  /              A  /              A  /
   | /               | /               | /
   I                 I                 U
                     U

   εi                œy                 ɑu
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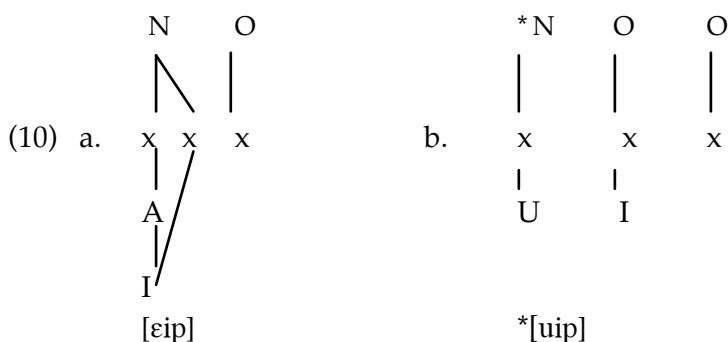
The difference between true and false diphthongs can be described in various ways. We assume that true diphthongs fill a binary branching nucleus, whereas false diphthongs consist of a nucleus (filled by the tense long vowel) followed by an empty Onset. This is in line with the representational assumptions of Government Phonology. We give the structures of *bij* and *knoei* as an example (omitting the initial consonants):

```
            N                          N    O
           /|                          |    |
(8)  a.   x  x              b.        x      x
          |                           |      |
          A/                          U      I
          ||
          I/
         [ɛi]                        [ui]
```

Apparently, an OCP-type of constraint is responsible for the fact that in both cases the adjacent vowels are not allowed to have the same element; but within nuclei a form of sharing is allowed and even obligatory that is not available across the syllable boundary. The interaction between the principles in (9) 'explains' (or at least describes) Property ii of true diphthongs in the box in section 1.

(9) a. **OCP.** Adjacent vowels are not allowed to dominate non-shared, identical elements.
   b. **Sharing.** Vowels in a nucleus have the same place of articulation.

According to **Sharing**, parts of diphthongs should have the same place. According to **OCP,** this can only be accomplished by element sharing. We also need an explanation why sharing is not allowed in configurations such as (8b); there are various possibilities here, but we will not go into them. It seems more generally the case that two vowels dominating the same vocalic material cannot be in different subsyllabic constituents: sequences such as [ji] are disallowed just as well as [ij].
The fact that consonants can follow true diphthongs, but not false diphthongs, Property iii, is understood because there is room for a new onset consonant after (8a), but not after (8b) (we omit the segmental content of /p/).

```
            N    O                      *N    O    O
           /|    |                       |    |    |
(10) a.   x  x  x            b.         x     x    x
          |                             |     |
          A/                            U     I
          ||
          I/
         [ɛip]                        *[uip]
```

The fact that *coronal* consonants can follow false diphthongs, can be ascribed to the more general fact that coronals can remain 'extrasyllabic' in Dutch as well as in many other languages, that is to say: they fall outside the syllable template. E.g. Dutch words cannot end in more than two consonants, *except* if the last consonants are coronals (*herfst* 'autum', *ernst* 'earnest') and cannot start with more than two consonants, except if the first one is *s* (*straat* 'street'). We might analyse this by stating that such consonants do not project syllable constituents.
This reasoning would lead us to posit the following syllable structure for /ɑu /

(replacing the one in (7)), given the observations of section 1.

```
        N    O
        |    |
        |    |
(11)    x    x
        |    |
        A    U
```
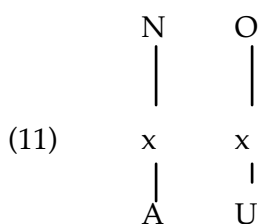
Notice that we now analyse the first part of the diphthong as not being rounded (this is necessary because of the **OCP** and the prohibition on sharing). This conforms to the transcription [ɑu] which we have hitherto analysed, but it should be noted that the transcription [ɔu] is also used in the literature, so that this is not a real argument. More importantly, we have now created a gap in the otherwise perfectly symmetrical system in (7), which we need to explain. Why is [ɑu] exceptional? We use the theory of place-driven phonotactics developed in Van der Torre (forthcoming). According this theory, the elements |A|, |I|, |U| can play a role in phonotactics:

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(12)   **Place-Driven Phonotactics (PDP)**
     a. The |A| element (velar) is attracted to rhymal positions
     b. The |U| element (labial) is attracted to onset positions
     c. The |I| element (coronal) is least marked

Van der Torre adduces arguments for this theory from the phonotactics of Dutch consonants. (12a) can for instance be used to explain the fact that the velar nasal can only occur in coda positions in Dutch (*lang* [lɑŋ] 'long', *[ŋɑl])

(13) *man* [mɑn] 'man', *nam* [nɑm] 'took', *lang* [lɑŋ] 'long', *[ŋɑl])

(12c) explains among other things the relative freedom of coronals consonants we have seen exemplified above; as a statistical piece of evidence in favour of (12b) it could be pointed out that there are many more words starting with *w* than starting with *j*; also, (12b) provides part of the explanation why the glide (or liquid) *w* [ʋ] can be the head of a complex onset, while the other glide (liquid) cannot (it should be noted that in the speech of many speakers of Dutch the *w* hardens to a fricative [v] in this position; but this is not the case in all dialects):

(14) a.   *wreed* [ʋreːt] 'cruel', *wraak* [ʋraːk] 'revenge'
     b.   *[lret], *[jrak]

PDP actually would mark the structure in (11) as a highly desirable structure. In particular, the |U| element seems attracted to the onset position. This can only happen in this particular configuration. Other diphthongs are not subject to a similar attraction in Standard Dutch.

3. Tilburg Dutch

Tilburg Dutch dialect is different from Standard Dutch in several respects. First, it has a vowel system that is somewhat more extensive, cf. (15) (based on Boutkan & Kosman

1996, Van Oostendorp 2000, Swets to appear):

(15)

	front unrounded	front rounded	back
a. lax and short	ɪ	ʏ	ɔ
	ɛ	œ	ɒ
			ɑ
b. lax and long	ɪː	ʏː	ɔː
	ɛː	œː	ɒː
c. tense (and long)	i	y	u
	e	ø	o
			a
d. diphthongs	ɛi	œy	ɑu

Furthermore, the diphthongs ɛi and œy are in complimentary distribution with the long vowels ɛː and œː respectively. We find diphthongs at the end of words and before inflectional endings, and long vowels otherwise:

(16) a. *blij*, [blɛi], 'merry', *rijdt* , [rɛi+t], 'drives' (the t is an inflectional ending)
   b. *gèèt* , [gɛːt] (Std. Dutch [gɛit]), 'goat', *rèèk*, [rɛːk] (Std. Dutch [rɛik]), 'rich'

We could take this to imply that all diphthongs in Tilburg Dutch are 'false' diphthongs, i.e. that they have the following structure:

(17)
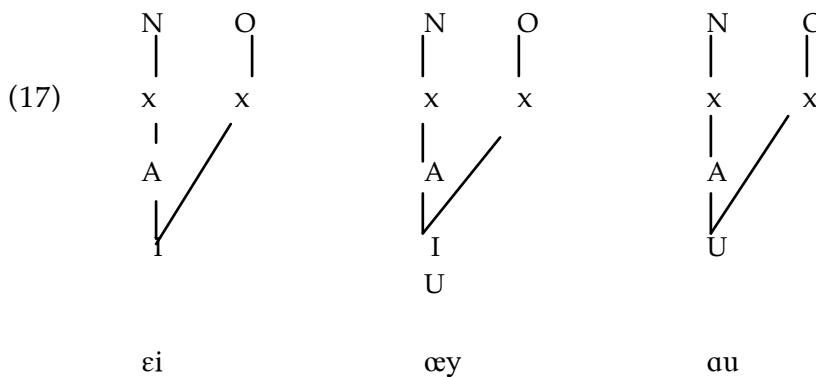
Apparently, the restriction on element sharing does not hold in Tilburg: elements can spread freely across constituent boundaries.
This now clarifies why diphthongs cannot be followed by consonants in Tilburg Dutch (we leave aside the issue why even tautomorphemic coronal consonants cannot follow diphthongs in this system; that seems another systematic property of the dialect). But why are long vowels forbidden at the end of the word? In Swets (to appear) this is analysed as an effect of a constraint called FinalC (McCarthy and Prince 1994, McCarthy 2002), a constraint which has an effect that word templates in many languages are word-final, in spite of the fact that open syllables are preferred elsewhere:

(18)   **Final-C**. Phonological words end in something consonantal.

If we assume that the glide at the end of the diphthong is more consonantal (less sonorous) than a low vowel, word-final gliding can be made to follow from this. Apparently, the inflectional endings do not count in the calculation of the end of the phonological word.

Interestingly, the [ɑu] is again an exception to this, in that it can occur before non-inflectional coronal consonants (and in the word *pauk* to which we will return below):

(19)   *kaus* [kɑus] 'stocking', *paus* [pɑus] 'pope', *hout* [hɑut] 'wood'

At first sight, this looks paradoxical: in Standard Dutch, the phonotactics of /ɑu/ is more restricted than that of other diphthongs (it can only occur before coronals), but in Tilburg, it is less restricted (it can occur word-internally). Notice however, first, that the long vowel [ɑː] (the long vowel that would come closest to [ɑu]) is lacking from the inventory, and second, that the diphthong in question still appears before a coronal consonant, so that the claim about syllable structure made here can still be maintained.

4. On *glauk* and *pauk* and other problems

To round up this paper, we now briefly return to the shaded boxes in the table in (4): the words *faun, Paul, pauk* and *glauk* which we have thus far excluded from the analysis.

⇒   As to *faun* and *Paul*, we note that these still end in a coronal, albeit a coronal sonorant. Coronal sonorants (or at least /n/) can marginally be extrasyllabic in other environments in Dutch as well. E.g. the *n* in *hoorn* [hoːrn] 'horn' is supposedly extrasyllabic, since we usually only find one consonant after long vowels. Note that many speakers tend to epenthesize a schwa between the two consonants. In that persepctive, *parel* [paːrəl] 'pearl' may be seen as an instance of extrasyllabic /l/

⇒   *Pauk* and *glauk* are slightly more problematic; the latter word seems unknown to many speakers, but *pauk* certainly counts as a normal word of Dutch (albeit a word with an 'onomatopoeic origin', according to De Vries & De Tollenaere). It should be noted that it probably is no coincidence that the extra segment is a voiceless velar stop. Within the word, syllables cannot be closed by more than *one* consonant after a short vowel (rather than more than *two* word-finally). Exceptions to this generalisation often involve a final /k/ (this is true for English as well):

(20)   *arctisch* [ɑrktis] 'arctic', *punctueel* [pʏŋktuel] ' puntctual'

This fact may even be related to the theory of Place-Driven Phonotactics: it probably is no accident that it is a velar which can act as a rhymal 'extra'.

Disclaimer. Several facts have gone unnoticed in this paper. For instance, we have no explanation to offer on why /ɑu/ can be followed by heterosyllabic /r/ (*laurier* 'laurel'), but /ɛi/ and /œy/ cannot; see Trommelen and Zonneveld 1989. We have also disregarded the marginal but interesting diphthong /ɔi/ (*hoi* 'hi', *goj* 'goy').

Appendix. On historical contingency

It could be argued that historically, many /ɑu/ sequences derive from original /ɑl/ or /ɔl/ before coronals (*oud* = 'old', *koud*='cold'), whereas the origin of /ɛi/ and /œy/ is

diphthongization of long high vowels (*tijd* 'time' from /tiːd/ etc.). This would explain most of the difference between /ɑu/ and the other two as a historic accident.

We believe that this explanation is not satisfactory for the following reasons:

☞ It begs the question: why was vocalisation of /l/ after back vowels restricted to a context before a coronal?

☞ Furthermore, loanwords with *au* have also been adapted, giving new phonotactic patterns (such as before /r/); why did no words ending in *auC* enter the language?

☞ One might say that the reason for non adaption of loanwords with *auC* is again a matter of historic accident; (5) shows that e.g. English, at present the strongest source of loanwords in Dutch does not present these sequences. But again, this is begging the question: *why* are these absent from English?

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